ORIGINAL

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of

Preparation for International Telecommunication Union World Radiocommunication Conferences	)))	IC Docket No. 94-31

To the Commission:

COMMENTS OF COMSAT MOBILE COMMUNICATIONS

COMSAT Mobile Communications

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SUMMARY

CMC believes that the prime objective for the United States at the 1995 World Radiocommunication Conference (WRC-95) is to assure that the global bands allocated to the Mobile Satellite Service (MSS) at the 1992 World Administrative Radio Conference (WARC-92) (1980-2010 MHz and 2170-2200 MHz), are available for use before the year 2000. There is also a strong need to secure new MSS allocations in addition to those allocated previously by WARC-92; and, we believe that the Commission should develop proposals for new MSS allocations, for consideration and adoption at WRC-95 or, if necessary, WRC-97.

Another urgent issue at WRC-95 is the requirement to obtain allocations for MSS feederlinks that are needed by gateway earth stations to communicate with non-geostationary satellites operating in the MSS service link bands. Most of the candidate MSS feederlink bands will use existing fixed satellite service (FSS) frequencies, and our comments should aid the Commission in determining the spectrum requirements and identifying appropriate MSS feederlinks.

The Report of the Voluntary Group of Experts (VGE) to simplify the Radio Regulations is a major agenda item for WRC-95. However, we are concerned that this item could consume too much of the Conference resources and time and make it difficult to resolve the urgent MSS issues at WRC-95.

Regarding the agenda for the 1997 WRC, we propose that high priority be given to any unresolved MSS issues at WRC-95: these

issues must be carried forward to the 1997 Conference. Moreover, we propose that the Commission give consideration to placing the issue of operating shipboard earth stations in certain FSS bands on the WRC-97 agenda. This type of service now authorized under several FCC experimental licenses, seem to fill a need for certain telecommunication applications which fall somewhere between traditional MSS and FSS ITU definitions.

In response to the Commission's initiative to make the preparatory process for WRC's more responsive to industry needs, we offer some specific suggestions. We agree that steps need to be taken now to streamline the process in view of the ITU's new two-year cycle of WRCs.

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To the Commission:

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COMSAT Mobile Communications ("CMC"), a business unit of COMSAT Corporation, hereby submits its comments in response to the Commission's Notice of Inquiry ("NOI") in IC Docket No. 94-31 regarding preparations for the 1995 International Telecommunication Union ("ITU") World Radiocommunication Conference ("WRC-95").[1] This proceeding is the vehicle for the U.S. telecommunications community and other interested parties to participate and provide information to assist the Commission in developing U.S. proposals on the issues to be addressed at WRC-95 and to refine further the preliminary agendas for WRC-97 and WRC-99.

As a major part of the United States preparations for WRC-95, the Commission has established an Industry Advisory Committee ("IAC") in parallel with this proceeding. The IAC provides the opportunity for the private sector to work together in an organized way to develop proposals and positions on WRC-95 issues that will assist the Commission in reaching final decisions on the U.S. proposals to be submitted to the ITU in advance of the Conference. As was the case in preparing for past conferences, we believe that the work of the IAC

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[1] Notice of Inquiry, IC Docket No. 94-31, adopted April 20, 1994, ("WRC-95 NOI").

will prove to be central to the preparatory effort and will form much of the basis for the U.S. proposals to the Conference. Given this broad opportunity to work within the IAC with all interested segments of the industry and government to collectively address and develop common positions on the issues of interest to the industry, CMC intends to focus much of its effort on the work of the several Informal Working Groups ("IWGs") operating under the IAC structure. In this way we hope to further elaborate and support our comments made in this proceeding.

I. INTRODUCTION

A. High Priority Issues for CMC at WRC-95

The issues at WRC-95 of prime interest to CMC are those that determine the early availability and usability of global spectrum allocated to the Mobile Satellite Service ("MSS") at the 1992 World Administrative Radio Conference ("WARC-92"). While we have a strong interest in securing new MSS allocations in addition to the WARC-92 allocations, in our view the approach that will best serve the U.S. interests at WRC-95 is one that emphasizes making the WARC-92 MSS bands usable at the earliest possible date before the year 2000. The United States also should work at the international level to identify suitable new bands for MSS above 1 GHz before WRC-95 and during the Conference itself in a cooperative effort to set the stage for adoption of new MSS allocations at WRC-95 or, if necessary, WRC-97.

MSS systems are being planned and design decisions are being made today that will use the WARC-92 bands to bring new personalized

mobile satellite services to the global marketplace before this century is over. Accordingly, there is an urgent need for WRC-95 to take appropriate actions to facilitate the use of the MSS bands allocated at WARC-92 and to modify Footnote 746B of the International Table of Frequency Allocations in order to bring forward the date of global availability of the bands 1980-2010 and 2170-2200 MHz from the year 2005 to before the year 2000.[2] These issues are on the WRC-95 agenda in Items 2.1(a) and (b).

Another issue of urgency concerns MSS feederlinks. WRC-95 must identify and allocate bands for feederlinks used by gateway earth stations to "feed" streams of traffic to satellites operating in the MSS service. Most or all of these feederlinks will use Fixed Satellite Service ("FSS") bands and, therefore, care must be exercised to avoid interference to satellites in geostationary orbits ("GSOs") operating in the FSS bands. Without these feederlink bands, future MSS systems cannot go forward. This issue appears as Item 2.1(c) on the WRC-95 agenda.

In our view, the early availability and usability of global MSS spectrum and the identification of suitable MSS feeder links should top the list of U.S. objectives for the Conference because they are issues which are ripe for decision at WRC-95.

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[2]The United States has already indicated the availability of these bands in 1996 in the United States at Footnote 746C of the International Table of Frequency Allocations. See 47 C.F.R. § 2.106, note 746C.

B. International Actions to Support MSS Agenda Items

The issues of concern to CMC are not new issues and a good deal of work has already been done, and continues to be done, within the United States and at the international level within the ITU Radiocommunications Sector ("ITU-R") to support positive results at WRC-95. For example, as described below, work is already underway in the ITU-R study groups for the Conference Preparatory Meeting ("CPM") next March regarding use of the global MSS WARC-92 allocations and identification of appropriate bands for MSS feeder links. Also, as discussed below, a number of countries, including the European Conference of Post and Telecommunications Administrations ("CEPT") countries, are taking steps to make the 2 GHz global MSS bands usable at an earlier date than 2005, reflecting a growing recognition that the market for MSS will be a major component of the future handheld personal communications services market. Indeed at WRC-93, where the agenda for WRC-95 was developed and agreed to, the Conference adopted a recommendation which authorizes Administrations to initiate immediately coordinations necessary to implement MSS networks in the 1980-2010 and 2170-2200 MHz bands prior to the year 2005 pending action at WRC-95 to change the date of global availability of these bands.[3]

In view of these actions and the progress of the work underway, there is every reason to expect that WRC-95 will be able to deal effectively with these important MSS issues. Nevertheless, it is

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[3]See Final Acts of the World Radiocommunications Conference (Geneva, 1993), Recommendation No. PL/2 ("WRC-93 Final Acts").

critical to the success of the Conference that the United States develop timely proposals that can be advocated and coordinated with other countries in the preparatory work prior to WRC-95.

C. National Actions to Support WRC-95 Agenda Items

Already the Commission has taken important and positive steps regarding early implementation of the 2 GHz global MSS bands in its June 9, 1994 decision on reconsideration concerning rules to establish new Personal Communications Services ("PCS").[4] In the PCS decision, the Commission recognized the potential value of MSS service and shifted its initial PCS allocation out of the 2180-2200 MHz band in order to preserve most of the WARC-92 MSS global allocations. Also of utmost significance to MSS and to the WRC-95 issue of facilitating use of the WARC-92 allocations for MSS, the Commission noted in the PCS proceeding that the MSS band at 1990-2010 MHz is paired with a portion of the broadcast auxiliary band used for Electronic News Gathering ("ENG") in the United States and that in the future this spectrum could potentially be reallocated for MSS use on a shared basis, if feasible, or exclusively, if suitable replacement spectrum could be found for broadcast auxiliary services. The Commission expressed its intent to initiate a proceeding to investigate these additional allocation possibilities in the near future with the purpose of accommodating MSS operations.

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[4] See Memorandum Opinion and Order, GEN Docket No. 90-314, adopted June 9, 1994, ("PCS Order").

The PCS decision, thus, preserves for allocation within the United States 50 MHz of the 60 MHz of global spectrum allocated at WARC-92 to MSS.[5] Equally important, this action demonstrates the Commission's intent to take the necessary measures to facilitate the use of the WARC-92 MSS global bands within the United States in a domestic proceeding that will be directly related to the instant proceeding preparing for WRC-95.

Associated with the Commission's decision in the PCS proceeding, and in support of the MSS industry's initiative to bring innovative services to the global marketplace, the National Telecommunications Information Administration ("NTIA"), in a letter to Chairman Hundt, expressed the Administration's strong support for maintaining MSS spectrum allocations consistent with the international commitments made at WARC-92.[6] NTIA noted that the efforts of the MSS industry could play a major role in the development of both domestic and international telecommunication and information infrastructures and, thereby, support the Administration's National and Global Information Infrastructure policies.

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[5]The PCS decision also allocated the band 1850-1990 MHz to terrestrial PCS within the United States. See id. at para. 97. This part of the PCS allocation conflicts with the WARC-92 MSS Region 2 allocation at 1970-1980 MHz and the global MSS allocation at 1980-1990 MHz and possibly renders these bands unusable for MSS in the United States. CMC notes, however, that in the many compromises leading up to the PCS decision, the MSS industry accepted this potential limitation, and we do not contest it here.

[6]See Letter to Chairman Reed Hundt from Larry Irving, Assistant Secretary for Communications and Information, United States Department of Commerce, dated May 31, 1994.

II. MSS ISSUES SHOULD BE GIVEN TOP PRIORITY AT WRC-95

A. An Urgent Need Exists to Open the 2 GHz Bands Earlier Than the Year 2005

1. Existing MSS Allocations in the L-band Are Becoming Increasingly Congested and the RDSS/MSS Bands Will Soon Follow Suit

From all indications, the demand for MSS spectrum is rapidly increasing worldwide. This high demand, coupled with the fact that MSS networks cannot share service spectrum links very effectively with other MSS networks unless the satellites are spaced at great angles from one another along the GSO, is likely to result in early saturation of the MSS allocations currently available in the L-band at 1.5/1.6 GHz. A similar fate will befall the RDSS/MSS bands at 1.6/2.4 GHz. In fact, the RDSS/MSS band is most likely to present sharing problems among non-GSO MSS satellite networks having overlapping coverage areas, using common segments of the same frequency band and employing omni-directional terminals.

Already in the L-band, over 30 GSO/MSS networks are currently in the process of coordination through the ITU-Radiocommunications Bureau ("ITU-BR"). Given the potential backlog of spectrum requirements for proposed, planned and operating systems, it seems likely that prior to the year 2000, the 1.5/1.6 GHz MSS allocations will be unable to accommodate all of the projected MSS traffic. This prediction appears likely even when the so called "paper" networks -- those that are unlikely to ever be implemented -- are discounted.

In the RDSS/MSS bands at 1610-1626.5/2483.5-2500 MHz, over 20 MSS networks have been filed with ITU-BR to date. Most of these MSS

networks are non-GSO systems. Studies conducted in the United States indicate fairly stringent inter-service sharing constraints in these bands due to the nature of the other services which are allocated in the 1.6/2.4 GHz band, including Glonass, the Radio-Astronomy Service, FSS, Radar Navigational Systems and the Industrial, Scientific and Medical ("ISM") services.[7] Because the RDSS/MSS band pair is smaller than the L-band MSS allocation (e.g. 16.5 MHz as compared to 34 MHz), there will likely be inadequate spectrum in the RDSS/MSS bands to support the long-term requirements of even two high-capacity MSS/non-GSO systems. The same studies also showed that there were rather severe capacity losses for each of six (5 non-GSO and one GSO) networks operating in the same frequency and coverage areas, even when rather ideal, homogeneous up/downlink ERP/EIRP density limits were imposed on each system.[8] As a result, it also seems reasonable to expect the RDSS/MSS bands would reach saturation shortly after the year 2000, assuming early implementation of several proposed "Big LEO" systems.

Given the expected early saturation in the two existing MSS bands, it is extremely urgent that WRC-95 provide access to other MSS allocations such as the MSS bands at 2 GHz which were allocated by WARC-92, but were given a later date of entry into force in the year 2005.

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[7] See ITU Radio Regulations Article 8, Table of International Frequency Allocations.

[8] See Report of The MSS Above 1 GHz Negotiated Rulemaking Committee, filed in CC Docket No. 92-166, Attachment 1 to Annex 1, Section 5, dated April 6, 1993.

2. A High Level of International Interest Exists in the 2 GHz Bands as Alternative Bands for MSS

To underscore the assertion that there is increasing demand for MSS spectrum and a consequent need to open up the 2 GHz MSS allocations much earlier than 2005, one has only to look at the variety of proposed MSS networks which have filed for the 2 GHz bands since WARC-92. The attached Table 1 shows that a mixture of GSO and Low Earth Orbit ("LEO") networks -- some 20 systems in all -- have filed with the ITU-BR, including two non-GSO and four GSO networks filed by the United States.[9] The large number of requests for coordination of MSS systems in the rather short two and one-half years since the 2 GHz bands were allocated at WARC-92, is itself indicative of the high demand for future MSS services that can be provided in these bands. The Administrations filing these requests with the ITU-RB appear to have concluded that the existing L-band MSS allocations cannot satisfy expected marketplace requirements for new MSS services. It is also worth noting that the date all of these MSS systems are anticipated to be brought into use is projected in the ITU-BR filings to be the years 1994-2000.

3. It Is in the U.S. Interest to Accommodate Earlier Dates of Entry into Force of the 2 GHz MSS Bands

With the prospects for high growth and new MSS systems, it is consistent with U.S. interests to advance the dates of entry into force of the 2 GHz MSS bands. MSS spectrum will be needed to accommodate second generation MSS networks to those already applied

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[9] See Table 1: ITU-BR Published 2 GHz MSS Systems, appended as Attachment 1 to the instant Comments.

for in the 1.6/2.4 GHz RDSS/MSS bands. In addition, American Mobile Satellite Corporation ("AMSC") recently has filed an application with the Commission to construct a 2 GHz follow-on system to their present planned L-band MSS network.[10]

The Inmarsat Council also recently announced at its 49th Session in May, 1994, that an affiliate organization will develop the Inmarsat-P system in the 2 GHz bands, with the aim of entering the marketplace with a commercially viable service in the 1999-2000 time-frame.[11] From CMC's point of view, there also is likely to be a community of MSS users within the United States and North America who will wish to have access to Inmarsat international mobile satellite connections to overseas destinations within the 2 GHz MSS bands via Inmarsat-P. The many diverse proposals for MSS systems at 2 GHz demonstrate that it is absolutely essential to open up access to the 2 GHz MSS allocations in the 1999/2000 time-frame.

Finally, at WARC-92 the U.S. Delegation introduced a footnote (No. 746C) to the 2 GHz MSS allocations which reads: "in the United States of America, the use of the bands 1970-2010 and 2160-2200 MHz by the mobile-satellite service shall not commence before 1 January 1996."[12] CMC urges the Commission at WRC-95 to continue the U.S. efforts to advance the use of the 2 GHz bands by MSS and to work to assure that global access to the 2 GHz MSS bands, as set forth in

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[10]Application of Personal Communications Satellite Corporation, filed April 7, 1994.

[11]See Supplemental Filing of COMSAT Corporation, File No. ISP-94-001, dated June 10, 1994.

[12]47 C.F.R. § 2.106, note 746C.

Footnote 746B, will be consistent with the dates of entry into force in the United States.

4. FPLMTS May Provide a Basis for Earlier Access to the 2 GHz MSS Bands

While Future Public Land Mobile Telecommunications Services ("FPLMTS") are not on the Agenda per se for WRC-95, there are some overlapping concerns with MSS that could be useful in securing earlier access to the 2 GHz MSS bands. Many other countries, notably those in Europe, are interested in using MSS as an adjunct to terrestrial land mobile communications or FPLMTS. Such countries may be supportive of a U.S. proposal at WRC-95 to advance the date of entry into force for the 2 GHz global MSS/FPLMTS bands.

As the Commission is aware, there has been a substantial amount of work done on FPLMTS in the ITU-R and ITU-T sectors. In the ITU-R, for example, TG 8/1 has recently approved a new Recommendation which identifies frequencies that are intended for use, on a worldwide basis, for FPLMTS, including the satellite-MSS component of land mobile usage.[13] This Recommendation states that "the simultaneous availability of terrestrial and satellite components of FPLMTS would improve the overall implementation and attractiveness of FPLMTS to both developed and developing countries."[14] Further, in planning the implementation of FPLMTS, in the bands identified, countries follow the principle that

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[13] See ITU-R Recommendation M.1036, entitled "Spectrum Considerations for Implementation of FPLMTS in the bands 1885-2025 MHz and 2110-2200 MHz."

[14] See id., at section Considering d.

"pre-implementation trials and testing may require the availability of the bands identified for FPLMTS prior to the year 2000, at least in part ... [a move which] could promote investment confidence."[15] Thus, the relevant ITU-R Study Group responsible for FPLMTS development, by including satellite and terrestrial components in their target date, has supported the need for early spectrum access to all FPLMTS bands prior to the year 2000.

In the context of FPLMTS, it is not very helpful to have different access dates for the United States and the rest of the world. If the worldwide date of entry into force in 2005 of the 2 GHz bands (Footnote 746B) was modified to match the U.S. date of entry into force of 1996 (Footnote 746C), it would facilitate the provision of the FPLMTS satellite component services in a timely fashion on a worldwide basis.

5. In Advancing the Dates of Entry of the 2 GHz Bands, the Commission Should Consider Frequency Sharing Issues Between MSS and Fixed Services

The technical aspects of frequency sharing between MSS and terrestrial fixed services ("FS") are being debated within the ITU-R Task Group 2/2. The meetings to date have produced some preliminary conclusions that sharing between the two services -- particularly satellite downlink interference into terrestrial fixed services and fixed terrestrial interference into satellite uplinks -- is very difficult; and, may only be manageable at the cost of very burdensome sharing constraints being imposed on both services. A better understanding of the MSS/FS sharing constraints will help the

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[15] See id., at section Recommends 2.

Commission develop a U.S. strategy to advance the dates of entry in force of the 2 GHz MSS bands.

CMC believes that there are "gaps" in the FS RF channelization plans recommended by Study Group 9 (notably Recommendations 283-5 and 383-5) which may permit some sharing between MSS and FS systems. For the medium capacity digital FS systems conforming to the channelization plan of Rec. 283-5 (see attached Figure 1) most of the MSS uplink in the 1980-2010 MHz band actually falls within a gap between the FS "GO" and 'RETURN" channels.[16] There is only about a 1 MHz overlap with channel 6. For the MSS downlink band (2170-2200 MHz) there is a larger overlap with FS, again only with FS channel 6. However, about 16 MHz of contiguous MSS downlink spectrum should have no overlap at all with such FS systems.

6. CMC Recommendation for U.S. Proposals to WRC-95 to Advance the Dates of Entry for 2 GHz MSS

In view of the foregoing, CMC recommends that the United States develop for submission to WRC-95 a set of proposals for advancing the date of entry into force for the 2 GHz MSS bands. As such, the United States could simply propose to move the dates of entry forward to the earliest time frame compatible with the U.S. Footnote 746C (1996-2000) across the entire 40 MHz of MSS allocations, including the 10 MHz in Region 2. Such a proposal would be more or less expected, by the rest of the world, as it would certainly be consistent with the U.S. positions taken at WARC-92 and WRC-93.

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[16] See Figure 1: ITU-R Recommendation No. 283.5, appended hereto as Attachment 2.

B. Feeder Link Spectrum Requirements

1. Technological Advances Will Ultimately Self-Regulate MSS Feederlink Requirements

The ITU has established a Task Group, TG 4/5, to study the spectrum requirements for MSS feederlinks in an international forum, and determine the feasibility of using certain FSS bands to support MSS systems operating their feederlinks either in the normal direction or in a reverse band working ("RBW") mode. Task Group 4/5 has determined that for the currently planned non-GSO MSS systems, the spectrum requirements in each feederlink direction vary from 200 MHz to 400 MHz within the 4-16 GHz frequency range and from 200-500 MHz within the 16-30 GHz range depending on whether two or more non-GSO MSS systems can share the feederlink spectrum.[17] CMC notes, however, that these requirements do not take into account certain technological advances that may reduce the required feederlink bandwidth for future MSS systems.

In most of the currently planned non-GSO MSS systems within the United States, the proposed payload designs use conventional, analog filtering for service link channelization and wideband, fixed interconnectivity between the service link beams and the feederlink beams. This architecture significantly impacts the feederlink spectrum requirements since each service link beam addresses its full potential bandwidth in the feederlinks. Due to the weight (mass) of conventional analog filters, it is not practical to provide individual feeder narrowband channel slots in the

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[17] ITU-R Document No. TG 4-5/TEMP/12.

multiplexers which can be assigned dynamically with traffic levels to the service beam ports and addressed into the corresponding segments of the feederlink spectrum.

However, narrowband channelization within the non-GSO payload is realizable through the use of digital processors with no severe mass and power penalty. These digital processors are facilitated by the new development of highly-efficient FFT algorithms implemented with application specific integrated circuits. The narrowband channelization along with flexible, dynamic reallocation of traffic beams will allow a consequential major reduction in the total amount of spectrum needed for feederlinks. Such technology currently exists but is costly to implement. However, this technology may be used to advantage by some non-GSO MSS systems to reduce the feederlink bandwidth requirements to below 100 MHz. Such reduction in bandwidth requirements will permit more efficient use of scarce spectrum resources for MSS feederlinks and facilitate sharing with other services.

Nevertheless, CMC believes that, even without implementing this new digital technology, MSS feederlink requirements in the range of 100-200 MHz in each direction for each MSS system would be adequate to support most non-GSO MSS systems currently being planned or under development.

2. The Prospect for Co-Directional Sharing with FSS and MLS Operations

Task Group 4/5 has adopted short-term interference criteria that would place considerable constraints on MSS systems to protect very sensitive FSS networks in the co-direction. Therefore, CMC

believes that co-directional sharing of non-GSO/MSS feederlinks with GSO/FSS is probably not feasible in the heavily congested FSS bands below 16 GHz.

However, sharing may be feasible in the lightly used FSS bands, such as the 6725-7025 MHz ("Allotment Plan" band) or the 7025-7075 MHz band, when interference reduction methods such as satellite diversity, adaptive power control or geographical isolation are used.

Furthermore, in the 5000-5250 MHz band TG 4/5 has concluded that sharing is feasible between non-GSO MSS feederlinks and Aeronautical Radio Navigation Service ("ARNS") employing microwave landing systems ("MLS") in both the uplink and the downlink bands and has forwarded this conclusion to the International Civil Aviation Organization ("ICAO") and other ITU study groups for further studies.[18] MLS, currently planned by ICAO in the band 5032-5092 MHz, occupies a bandwidth of 150 kHz with a 25 dB carrier-to-interference protection criterion. Task Group 4/5 has shown that in the 5000-5250 MHz band, up to 5 separate non-GSO MSS systems operating within their required feeder downlink power flux density limit of -137 dBW/4kHz/m2 would not cause harmful interference into MLS receivers at all angles of arrival when a -120 dBm maximum permissible level of interference is assumed. Furthermore, TG 4/5 expects that MLS aircraft receivers at a 3 degree glide slope will not suffer excess interference from MSS feeder uplink provided that the MSS land earth station operates

[18]ITU-R Document No. TG 4-5/TEMP/6.

above a 5 degree elevation angle and is sited beyond a minimum distance from the MLS transmitter.

CMC urges the Commission to support the use of the 5000-5250 MHz band for MSS feederlinks. In this regard, CMC notes that the Federal Aviation Administration ("FAA"), which has previously opposed use of the 5 GHz band by MSS for feederlink operations without providing any supporting evidence, has recently publicly announced its decision to abandon the use of MLS 5 GHz in favor of systems adopting the Global Positioning Service ("GPS") for future radio navigation purposes.

3. The Prospect for Sharing with FSS Using RBW Architecture

Task Group 4/5 also has shown that sharing between non-GSO/MSS feederlinks in the reverse band mode and GSO/FSS systems in the forward band mode is technically feasible in the C, Ku and Ka bands including the Allotment Plan bands (i.e., the bands 4500-4800/6725-7025 MHz and 11.20-11.45/12.75-13.25 GHz).[19] The satellite-to-satellite interference, in both directions, has been found to be well within the acceptable interference criteria. The separation distances between non-GSO/MSS earth station and GSO/FSS earth station have been found to be reasonable for coordination purposes and can be further reduced with site shielding. The only difficulty with RBW operation, as noted by TG 4/5, is that this technique may introduce earth station coordination complexities in heavily congested FSS bands. CMC agrees with this consensus finding

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[19] ITU-R Document No. TG 4-5/TEMP/9.

of TG 4/5, but we maintain that there are still a number of lightly used FSS bands which will support RBW operation. Additionally, CMC concedes that there would be operational difficulties in the use of RBW in the Ka-band FSS allocations (e.g., 30/20 GHz) because of uncorrelated differences in atmospheric fading characteristics between the uplink and downlink bands.

Despite these few limitations, CMC strongly endorses the use of RBW in the lightly used FSS bands and urges the Commission to seek further allocations and regulatory decisions at WRC-95 in order to take advantage of this spectrum sharing technique.

4. Interpretation of RR 2613 and Categorization of Allocations in the FSS Bands

In assessing the non-GSO MSS feederlink requirements, TG 4/5 has drafted a Table summarizing the current use of FSS allocations and related procedures in the Document 4-5/TEMP/16. Because of conflicting interpretations of Radio Regulation 2613 based on the need to protect GSO/FSS and the need to accommodate non-GSO/MSS feederlinks, TG 4/5 has broken new ground by proposing 3 different categories of allocations in the FSS bands. The first category will allow GSO/FSS networks to have priority over non-GSO/MSS feederlink networks in a specific transmission direction. In the second category, non-GSO/MSS systems will have priority over GSO/FSS in a specific transmission direction including RBW operation. In the third category, both non-GSO/MSS and GSO/FSS systems will have equal status and RR 2613 in this case would not apply.

CMC supports this categorization of the FSS bands which can be used to allocate the frequency spectrum so as to accommodate the

needs of both non-GSO/MSS and GSO/FSS operators. In this endeavor, TG 4/5 has included a Table in the Document 4-5/TEMP/24 in which each of the FSS bands between 3 and 31 GHz have been identified according to the 3 categories of priority discussed above. This Table has not been formally approved, but the parties involved have been asked to make contributions to the Table for the next TG 4/5 meeting especially for those bands noted by asterisks.

5. FSS Preferred Bands for MSS Feederlinks

It would be in the U.S. interest at the next TG 4/5 meeting and at the WRC-95 to promote bands below 16 GHz for MSS feederlink as there is considerable interest from a number of U.S. and other MSS operators for use of these bands due to the technical advantages in operating below 16 GHz. Initially, the Ka-band (30/20 GHz), was considered as alternative MSS feederlink spectrum by some non-GSO MSS providers because it was identified as a lightly used FSS band and was attractive from a coordination perspective. However, most non-GSO MSS providers now consider the Ka-band to be the band of "last resort" for feederlinks for the following reasons.

If the Ka-band were used for MSS feederlinks, non-GSO MSS spacecraft would have to use spot beams with extremely high EIRP and an adequate power control algorithm to combat deep rain fades. The use of a global beam with small margins is technically possible, but such low-gain beams could only be used under clear weather conditions in order to conserve spacecraft power. However, the use of spot beams presents another problem: it will limit the number of locations on the earth where the gateway stations could access the

MSS feederlinks. In order to provide adequate feederlink coverage of rain fade regions within the spot beams, connectivity between gateway stations will be required through the use of diversity paired gateway stations. This, in turn, could lead to an increase in the ground segment cost. Furthermore, the non-GSO MSS systems could not employ cross-polarization techniques on the feederlinks because the atmospheric effects at Ka-band distort the plane of polarization. Therefore, Ka-band feederlink requirements on a relative basis will be double those of lower frequency bands in which cross-polarization can be implemented. CMC believes that the use of lower frequencies (e.g., C-band or Ku-band) for MSS feederlinks will greatly reduce the cost and implementation of both the space and ground segments of non-GSO MSS systems.

The need to identify bands which are useful for MSS feederlinks in terms of cost and implementation is currently under consideration within the Informal Working Group-4 ("IWG-4") of the U.S. Industry Advisory Committee for WRC-95. The Table of priority of usage drafted by TG 4/5 provides a good starting point. However, this Table has to be whittled down to support non-GSO feederlinks by eliminating bands from consideration which are heavily congested with FSS or VSAT operations.

The Commission has correctly identified, at paragraph 23 in the NOI, that the bands 3700-4200 MHz, 5925-6425 MHz, 11.7-12.2 GHz, 12.2-12.7 GHz and 14.0-14.5 GHz, are too congested for non-GSO MSS feederlink use.[20] Nevertheless, there are other C-band and Ku band

[20] WRC-95 NOI, at para. 23, note 22.